

1           1. A procedure for activating a membrane-electrode  
2 assembly (MEA) of an electrochemical cell operating at  
3 substantially ambient conditions, said activation procedure  
4 including the steps of:

5           a) exposing the MEA to temperatures higher than ambient  
6 temperature, and substantially simultaneously back-  
7 pressurizing gaseous reactants;

8           b) after the activation of the electrochemical cell,  
9 returning conditions of said electrochemical cell to  
10 ambient conditions; and

11          c) operating said electrochemical cell.

1           2. An electrochemical cell operating according to the  
2 procedure of claim 1, comprising a proton-exchange membrane  
3 fuel cell.

1           3. An electrochemical cell operating according to the  
2 procedure of claim 1, comprising a direct methanol fuel cell.

1           4. The electrochemical cell operating according to claim  
2 2, comprising at least one MEA composed of an ion-conducting  
3 membrane, and at least one catalyst layer bonded thereto.

1           5. The electrochemical cell operating according to claim  
2 2, comprising at least one MEA composed of an ion-conducting  
3 membrane, and two, spaced-apart catalyst layers, each being  
4 bonded on opposite sides of the membrane.

1           6. The electrochemical cell operating according to claim  
2 3, comprising at least one MEA composed of an ion-conducting  
3 membrane, and at least one catalyst layer bonded thereto.

1           7. The electrochemical cell operating according to claim  
2 3, comprising at least one MEA composed of an ion-conducting  
3 membrane, and two, spaced-apart catalyst layers, each being  
4 bonded on opposite sides of the membrane.

1           8. An electrochemical cell operating according to the  
2 procedure of claim 1, comprising membrane materials selected  
3 from a group of materials consisting of: nonfluorinated  
4 ionomers partially fluorinated ionomers, perfluorinated  
5 ionomers, sulphonated polyetheretherketone, sulphonated  
6 polysulfone, sulphonated polyphosphazene, polystyrene  
7 sulphonic acid, and acid-doped polybenzimidazole.

1           9. The electrochemical cell operating according to the  
2 procedure of claim 1, comprising a membrane containing organic  
3 or inorganic dopants.

1           10. The electrochemical cell operating according to the  
2 procedure of claim 1, comprising a membrane containing organic  
3 or inorganic fillers.

1           11. The electrochemical cell operating according to the  
2 procedure of claim 1, comprising membranes composed of mixed  
3 ionomers forming composite membranes.

1           12. The electrochemical cell operating according to the  
2 procedure of claim 1, comprising a laminated membrane.

1           13. The electrochemical cell operating according to the  
2 procedure of claim 1, comprising a membrane with a supporting  
3 template, whose pores are filled with at least one ionomer.

1           14. The activation procedure according to claim 1, where  
2 catalysts, either unsupported or supported, are used to  
3 fabricate said MEA.

1           15. The activation procedure according to claim 1,  
2 wherein the electrochemical cell operates at a temperature  
3 during activation that is higher than the temperature at which  
4 the electrochemical cell is intended to operate, but not too  
5 high that it can cause decomposition of the electrochemical  
6 cell materials or dehydration of the MEA.

1           16. The activation procedure according to claim 1, where  
2 gaseous reactants are pressurized.

1           17. The activation procedure according to claim 16,  
2 where gaseous reactants are pressurized to less than 5  
3 atmospheres.

1           18. The activation procedure according to claim 16,  
2           wherein a pressure difference between a cathode gaseous  
3           reactant and an anode gaseous reactant is less than 5  
4           atmospheres.

1           19. The activation procedure according to claim 1, where  
2           the activation procedure lasts more than approximately 5  
3           minutes.

1           20. The activation procedure according to claim 1, where  
2           the activation procedure further comprises the step of:

3           d)    monitoring said electrochemical cell during the  
4           activation.

1           21. The activation procedure according to claim 1, where  
2           the humidification conditions of gaseous reactants are  
3           controlled.

1           22. The activation procedure according to claim 1, where  
2           the electrochemical cell is operated between a changing load  
3           and a constant load.

1           23. The activation procedure according to claim 1, where  
2           the electrodes contain various amounts of catalysts, ionomers,  
3           and/or water repelling agents.

1           24. The activation procedure according to claim 1, where  
2           the MEA includes catalyst-coated membrane (CCM).

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